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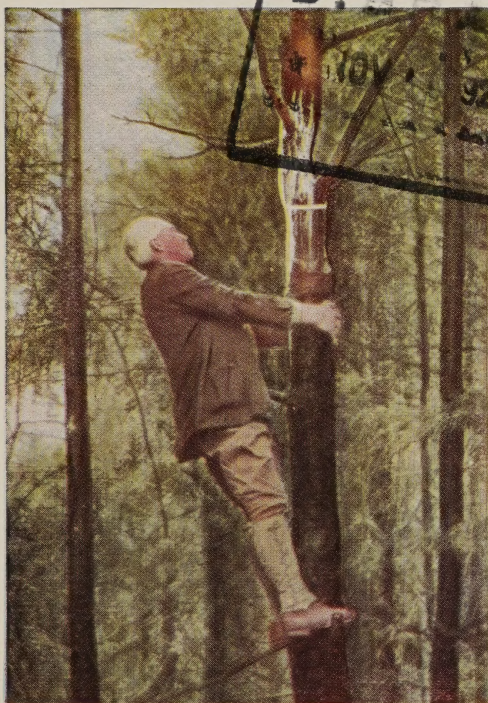
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How to Save Your White Pine Crop

**Immediate Action is Necessary
To Protect It from the**

BLISTER RUST

You Can Safeguard Your Pine



A thirty-five-year-old white pine dying from blister rust. The rust first killed the branch on the left of the canker, then girdled the trunk. Note constriction at centre of canker.

DO YOU KNOW

that the blister rust cannot spread from pine to pine except by means of currant and gooseberry bushes?

**U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF PLANT INDUSTRY
OFFICE OF BLISTER RUST CONTROL**

A WARNING



Diseased white pine showing blisters. These are usually produced during April and May.

Your white pines are in immediate danger from the blister rust. Pull up nearby currant and gooseberry bushes before they cause the destruction of your pines. Show this leaflet to your neighbors. Form a local White Pine Protective Association. Pull together and pull now.

BLISTER RUST ON PINE IS TRANSMITTED ONLY TO CURRANT AND GOOSEBERRY BUSHES. IT CANNOT SPREAD DIRECT FROM PINE TO PINE.

White pine blister rust was brought from Europe in recent years. It is now present throughout New England and northeastern New York, and is spreading elsewhere in New York, and in New Jersey, Pennsylvania, Wisconsin and Minnesota. Blister rust was not discovered attacking native white pine in North America until 1913. Today, nine years later, one tenth of the pines over large areas are diseased, and in many small areas all pines are dead or dying from the rust.

The blister rust is caused by a parasitic fungus which grows within the pine bark girdling the trunk and killing the tree. The infection creeps slowly through the bark until the trunk of the tree is girdled. Small trees are killed in four to six years. Pines over four inches in diameter are killed in eight to twelve years, or more, depending on the size of the tree and how quickly the infection reaches the trunk. The top dies, and frequently it breaks off at the point of girdling, thus destroying the value of the tree a considerable time before it is entirely dead.

How Blister Rust Spreads.

Blister rust is spread by very small spores (like seeds) scattered by the wind. Spores blown from diseased currant or gooseberry

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Look for this orange or brown colored rust on the under side of currant and gooseberry leaves. The rust is found from June until the leaves fall in the autumn.



DISEASED CURRANT AND GOOSEBERRY BUSHES TRANSMIT THE DISEASE TO WHITE PINES OF ANY SIZE.

leaves start the blister rust on a white pine. The first evidence of the disease on the pine is a golden-yellow spot on the needle. This spot is no larger than a pin prick, hence almost invisible. About a year is required for the fungus to grow back through the needle into the bark. The bark gradually becomes swollen, forming a canker, and at each end of the swelling the bark is tinged with a bright orange color. It requires considerable experience to detect young blister rust cankers prior to the spring of their third year, when the blisters appear. After the third year, the blister rust fungus grows through the bark at the rate of three to seven inches each year. The diseased bark slowly dies and dries out. Sometimes the rust starts directly on the needle-bearing portion of the trunk. More often it first attacks a twig from which it advances to a branch and finally girdles the trunk. On the larger branches and trunks growth of the wood continues above and below the girdle for several years, causing a constriction at the point of girdling. In any case, however, the fungus works down the tree and death is certain to result.

The blisters break through the diseased bark early in the spring, principally in May. They are about the size of navy beans, and orange yellow in color. Later in the season the bark that is broken open by these blisters turns dark in color and dies, but thereafter, until the tree dies a new crop of blisters appears each spring on the live bark adjacent to the dead area.

WHITE PINE

The blister rust is a deceptive disease. It is difficult to detect on pines until the third or fourth year after they are infected. Your pines may even now be severely diseased, since they usually remain green and seemingly thrifty for several years after infection.



Young blister rust infection on pine seedling. Note orange-yellow color, constriction and swelling. The dead bark at the center of the canker shows irregular cracks where the blisters pushed through early in the spring.

YOUR PINES ARE SAFE—IF YOU PULL UP ALL CURRANT AND GOOSEBERRY BUSHES FOR A DISTANCE OF 900 FEET.

The blisters are filled with dust-like spores. These spores live a long time and are easily blown long distances by the wind, and some of them fall on currant and gooseberry leaves, where they sprout like ordinary seeds and grow into the leaf. A few weeks later an orange-yellow rust appears on the under-sides of the leaves. This rust is a mass of spores which spread the disease to other currant and gooseberry bushes throughout the growing season. In June only a few leaves show the rust, but by September all of the currant and gooseberry bushes in the vicinity may be heavily diseased.

From late June until the leaves fall, spores of another kind are produced on these diseased currant and gooseberry leaves; these spores infect white pine trees with the blister rust.

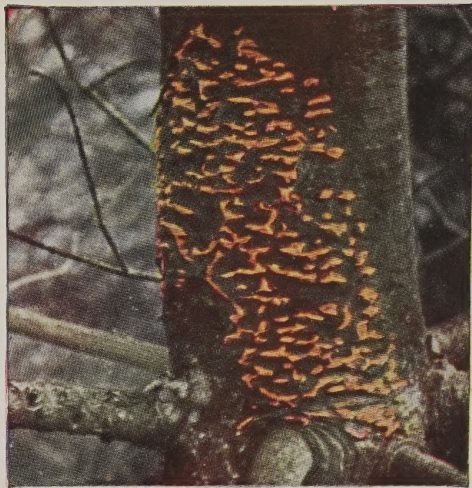
WHY BLISTER RUST CAN BE CONTROLLED.

It has already been made clear that the blister rust cannot go directly from one pine to another. It must first grow as a rust on currant and gooseberry leaves. The spores which transmit the disease from currant and gooseberry leaves to white pine are very delicate and live only a few minutes, hence the spores die before they reach the pines at any great distance. Therefore, the remedy against the blister rust is to pull up all wild and cultivated currant and gooseberry bushes within 900 feet of pines. The exact distance will vary with

1. Work systematically, look for Wild Currants and Gooseberries along stone walls, in old pastures, and in swampy locations.
2. Destroy Cultivated Bushes (particularly black currants) as they are located in exposed situations from which the disease can be more readily spread by the wind.
3. Be sure that all roots are pulled out; otherwise sprouts will develop.

For Additional Information Address

Mass. Department of Agriculture
136 State House, Boston, Mass.
Dr. Arthur W. Gilbert, Commissioner



Showing Orange Colored Blisters on trunk of a White Pine infected with Blister Rust. This condition can only be seen in the spring or early summer (April, May, June).

Insure Your White Pine

AGAINST THE

White Pine Blister Rust



Showing the rust on the underside of a currant leaf. Same appearance is found on diseased gooseberry leaves. This condition can be found from early summer until the leaves drop in autumn.

In order to protect White Pine from Blister Rust, a dangerous Plant Disease, **DESTROY WILD and CULTIVATED CURRANT and GOOSEBERRY BUSHES** that are within 200 to 300 yards of the pine to be protected. These bushes transmit the disease; it cannot spread from pine to pine.

These bushes can be found and destroyed by pine owners at a very reasonable cost. (OVER)

local conditions, but 900 feet has proved to be a safe distance on the average. But, cultivated black currants are especially susceptible to the rust and should never be grown in pine regions. Pine stands more than 900 feet from infected currant and gooseberry bushes have not suffered commercial damage except when the rust spread from cultivated black currants.

WHAT TO DO:

1. Find and uproot every wild currant and gooseberry bush within 900 feet of the white pines you desire to protect. Be sure to examine all of the ground for the wild bushes. Remember there are many kinds of these bushes, such as wild gooseberry, skunk currant, and wild red and black currants. Work systematically and carefully. One man can obtain effective results in clearing the land of wild currants and gooseberries. The best work is done by a crew of five men working abreast. The men should be spaced 6 to 12 feet apart in line, depending on the amount of brush and the abundance of currant and gooseberry bushes. A sixth man should closely follow the crew to act as foreman and see that no bushes are missed.



A 15 foot white pine girdled by the blister rust and so weakened that the top was broken off by the wind.

2. Cover the ground in narrow strips. Be careful not to miss ground between strips. This can be avoided by marking the strip boundaries by dropping small pieces of paper on the ground, or by breaking branches. Look thoroughly in brushy places, old orchards, pastures, low swampy places, along stone walls, rocky ledges and roadsides.

3. Pull bushes out by the roots; cutting them off is useless and a waste of time. Be sure to get all of the roots, thus avoiding danger from sprouts. Use a grub hoe on large bushes. Hang up the bushes where the roots will dry out and die quickly. If thrown on the ground they may continue to live.

4. In addition to pulling out wild currant and gooseberry bushes within 900 feet of the pines, destroy the cultivated varieties of these bushes within that limit. This includes flowering or "spice" currants.

5. Cultivated black currants are very susceptible to the blister rust. It is unlawful in some states to grow or sell these plants. They should not be grown anywhere in white pine regions, unless at least a mile from any pine which it is proposed to save.

REMEMBER.

1. Blister rust kills white pines. Any pine that has five needles in a cluster is subject to attack by blister rust. It does not attack hard pines (2 and 3 needles in a cluster).

2. Blister rust cannot spread from pine to pine. It is transmitted to pine only after developing on currant or gooseberry leaves. It lives in the pine bark from year to year until the tree is finally killed.

3. Any pine woodlot can be protected from the blister rust if all wild and cultivated currant and gooseberry bushes within 900 feet of the pine are pulled up. This should be done before the bushes become heavily "rusted" since pulling up these bushes will not save the pine after it is infected. The ground should be looked over again after five years.

4. The cost of uprooting wild currant and gooseberry bushes varies from 10 cents to \$2.00 per acre, depending on local conditions, but has averaged only 51 cents per acre on over a million acres cleared of these bushes since 1917.

5. Pines under 20 years old are especially in need of immediate protection.

6. Do not hesitate to plant white pine for a timber crop. Select planting sites as free from currant and gooseberry bushes as possible. Clear out all of these bushes for 900 feet around the area to be planted. Plant trees in the open spaces in your pine woodlot and thus prevent the growth of currant and gooseberry seedlings.

7. White pine is a profitable crop. It will pay you well to protect it from the blister rust. You can do it by starting at once; it is not difficult nor expensive. Act now; delay means death to the pines. Keep the pine lands productive. Get your neighbors to co-operate with you in saving the white pine in your neighborhood.